

ABSTRACT

A method of forming a semiconductor structure including providing a single crystal semiconductor substrate of GaP, and fabricating a graded composition buffer including a plurality of epitaxial semiconductor  $\text{In}_x(\text{Al}_y\text{Ga}_{1-y})_{1-x}\text{P}$  alloy layers. The buffer includes a first alloy layer immediately contacting the substrate having a lattice constant that is nearly identical to that of the substrate, subsequent alloy layers having lattice constants that differ from adjacent layers by less than 1%, and a final alloy layer having a lattice constant that is substantially different from the substrate. The growth temperature of the final alloy layer is at least 20°C less than the growth temperature of the first alloy layer.

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